The International Summer School on "Diffraction at the Nanoscale: Nanocrystals, Defective & Amorphous Materials"

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Following a number of traditional scientific meetings organized by some of us since 1992 in several locations throughout Italy (Modena, Gargnano, Pisa, Trento, Frascati, Milano, Alessandria, and Martina Franca), in 2008 we began to give these schools a more international flavor. Accordingly, the first, very successful, event, jointly organized in Switzerland by the Italian (AIC) and Swiss (SSCr) Crystallographic Societies and by the Paul Scherrer Institute (PSI), took place in 18–22 June 2008 (see *Powder Diffraction*, Vol. 23, No. 3, pp. 272–273, September 2008). In 2009, an International School on "Scattering Techniques: From Microscopic to Atomic Structures" was organized by AIC in Camerino, Italy.

Thanks to the enthusiasm raised among the young attendees, in 2010 we organized another International Summer School in Villigen, focusing on new, frontier, topic in crystallography and materials sciences, such as the development of characterization techniques for the investigation of disordered, nanosized, and defective material, for which the traditional Bragg approach fails.

The dense school program included lectures, demo sessions, tutorials, and diffraction measurements at the materials science beamline of the synchrotron at the Swiss Light Source of the PSI. Lectures were typically given in the morning sessions with the entire audience in the main lecture room, while (plenary) demo sessions followed in the afternoon; two full days were allotted for tutorials (experimental sessions and data analyses) for students subdivided in smaller groups.

In the first day, Dr. van Petegem, Dr. Malavasi, Dr. Černý, and Professor Domínguez-Vera introduced the vast realm of nanosized matter in materials science, chemistry, physics, and biology. In the following day, Professor Scardi, Dr. Gozzo, and Dr. Zaharko presented the theoretical and experimental background necessary for a meaningful interpretation of the (X-ray and neutron) diffraction results of nanocrystals and nanoscale-ordered matter. Later in the week, Professor Billinge, Professor Neder, Professor Keen, Professor Scardi, Dr. Cervellino, Dr. Guagliardi, Dr. Leoni, Dr. Božin, and Dr. Tucker presented different approaches (pair distribution function, Debye function, reverse Monte Carlo, whole pattern modeling, etc.), validated by the extensive use of the PDFGETX/N, DEBUSSY, WPPM, DISCUS, GUDRUN, and DIFFAX+ suites of programs, with which the attendees got acquainted in the tutorial sessions. Finally, Dr. Abolhassani, Dr. Diaz, Dr. Giannini, and Dr. Favre-Nicolin introduced transmission electron microscopy analyses and the basic concepts of coherent diffraction imaging, including a number of very interesting applications in nanosized crystals and aperiodic objects.

The International Summer School social dinner took place in the heart of the cozy village of Villigen in Thursday evening, from which the group photo shown here is taken.

We also organized lunches and dinners to encourage the participants to have further discussions among themselves and with the teachers. Accordingly, students, teachers, and tutors fruitfully exchanged their ideas, skills, and experience throughout the entire week. Needless to say, it was a very successful scientific week.

In order to maintain a high teacher-to-student ratio, we limited the participant number to a maximum of 53. Of these, 25 regular participants were accepted with the first-come-first-served basis (online registrations needed to be closed within five days after opening!), while the remaining 18 received either partial or (in a few cases) total financial

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support. The grants were assigned according to merit, pertinence to ongoing research subjects, nationality, age, and chronology of registration. Students came mostly from European Countries (including former CSI States), but attendees from Brazil, Algeria, USA, and India were also present.

Most of the grantees were supported by sponsoring agencies (including the International Centre for Diffraction Data, the International Union for Crystallography, and the Swiss Science Foundation), which, together with other Institutions (the Insubria International Summer School, AIC, and SSCr), allowed raising of funds to sustain a minimal amount of reimbursement for students and teachers.

In addition, the volunteering by all speakers made it possible to assemble a 220 page book entitled "Diffraction at the Nanoscale: Nanocrystals, Defective & Amorphous Materials," edited by A. Guagliardi and N. Masciocchi. This book is specifically targeted to the new generation of crystallographers and material scientists, dealing with nanocrystalline and defective materials. Both the novice and the experienced scientists will likely find therein new and relevant scientific aspects, as well as a large bibliographic section. Three main sections can be distinguished: *part A*, contributions exemplifying the wide world of nanomaterials, requiring new powerful tools for nanostructural characterization; *part B*, theoretical aspects of total scattering methods, simulation, and modelling techniques; and *part C*, principles and applications of imaging techniques. This book was freely distributed to all participants and is now available for a nominal price from the publisher, Insubria University Press (iup@uninsubria.it).

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